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Established 1859 Pioneer of the Gas Industry

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WHOLE No. 3065

NEW YORK, SATURDAY, JULY 9, 1927

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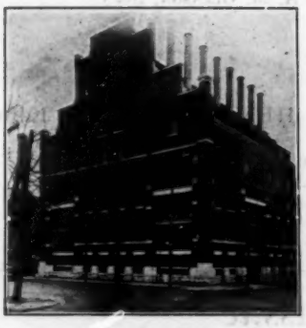

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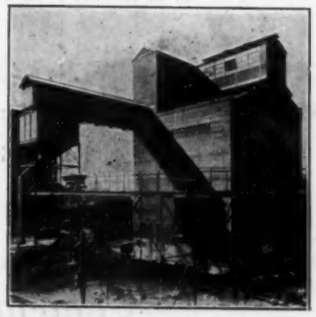

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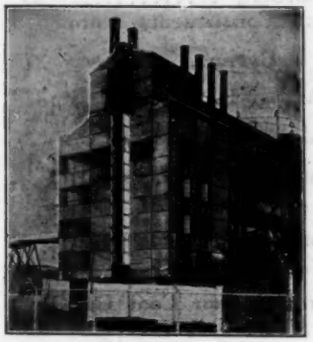

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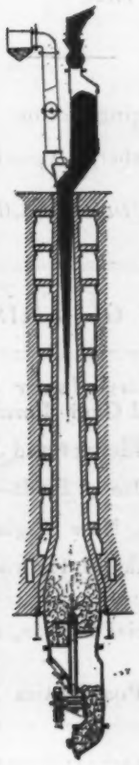

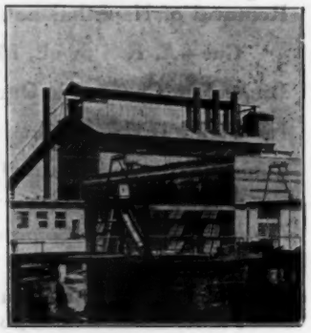

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SIXTY-SEVENTH YEAR

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Regulation in the Gas Industry

Application and advantages of automatic control

Ismar Ginsberg
Associate Editor

THE chemist—the inventor in the chemical field—works in his laboratory and develops a new process, a new product or an improved method of performing a certain operation. He works with test-tubes, beakers, Bunsen burners and other similar apparatus, and during the entire progress of his experiment he has his reacting substances under accurate and direct control. He finally perfects the chemistry of his process, and then his work is over. But at this point the work of the engineer starts. He has to deal with large apparatus, made of opaque materials instead of the glass of the laboratory equipment, with large quantities of material. The chemistry of the process may be well known and all its details worked out, but the commercial application of the process, which is, after all, the acid test of its usefulness, is still to be developed. The engineer must be able to control his operations in the plant apparatus if he hopes to obtain the results, or, rather, approximate those that were secured by the chemist in his laboratory.

Gas Making Not an Exception

Every successful chemical process, or process in which chemistry is involved, has gone through this development, and the gas making process is by no means an exception to this rule. And the success that has been gained in these fields, the rapidity with which the process, chemically developed by the laboratory worker, has gained commercial prominence, the economy of the manufacture, the quality of the products made, and, in fact, all the results obtained in large scale chemical operations have been due in no small part to the fact that accurately made and thoroughly reliable instruments have been available for measuring and controlling the varying factors, temperature, pressure, speed, etc., which are so potent in determining the outcome of any chemical reaction.

Even in its very infancy gas making was seen to be a process in which large apparatus and large masses of materials must be employed even to make what might be called small amounts of gas. The equipment of the smallest gas works, and unquestionably of the average sized one, is very large in comparison to the apparatus used in the average sized chemical plant. Furthermore, the chemical operations in the gas works, the making and purification of the gas, and in addition thereto, the physical operations of measuring it and distributing it under control, were soon seen to be specially dependent on such factors as temperature and pressure. It was therefore immediately evident that if the gas were to be properly and economically manufactured, completely purified and accurately measured and controlled, it would be necessary to use various temperature and pressure instruments of the indicating, recording and automatic controlling type. There is no question that the development of the gas industry today would have been materially curtailed, if indeed made possible, had not such instruments been available.

Gas Industry on Eve of Greater Development

As gas men know, the gas industry is at the beginning of a still greater development. The demands of industry for fuel have been felt by the gas man, and he has arranged to meet these demands by supplying gas as an industrial fuel. As his industrial load develops, his gas making equipment must be increased, and what is more important than any other consideration, he must be able to make his gas under such accurately controlled conditions that costs are reduced to a minimum, thus enabling him successfully to compete with other fuels, such as oil, advocated for the same industrial purpose. The instrument makers have followed the development of the gas industry and have devised instruments that enable the gas works to eliminate labor, reduce costs and make better products. Such instruments as indicating and recording pyrometers for use on the waste heat boilers, coal gas retorts and water gas

superheaters, the calorimetric thermometer for testing the gas for its calorific value, various automatic controlling pressure and temperature devices, are examples of the attention that the instrument makers have given to the problems of the gas man. They are potent factors in helping him to make gas efficiently and economically.

It is manifestly too great a task to try to tell the gas man about the various instruments that are available to him in a short article of this character, and hence we shall limit ourselves to pointing out certain cases wherein automatic temperature control can be of material assistance in the manufacture of gas. It is really unnecessary to talk to the gas man on the value of indicating and recording instruments, which he now profusely uses in the gas works.

Advantage of Automatic Control

Automatic control of temperature and pressure has for its purpose the elimination of reliance on the operator to manipulate steam, water and other valves to effect certain conditions within a heating or cooling apparatus. Proper automatic control, which is now afforded by the instruments made by modern manufacturers, is fraught with many advantages over hand control. Not only is there saving in labor, for the automatic instrument requires no watching, but the productivity of the apparatus is increased and the quality of the product improved. The maintenance of the desired pressure and temperature within an apparatus, used in gas manufacture, by automatic means confers special advantages on the user according to the specific purpose for which the instrument is used.

For example, in the manufacture of coal gas, after the gas has passed out of the retorts into the hydraulic mains and the hydraulic main governor, it enters the purification system, the first member of which is the primary condenser. This apparatus can be automatically controlled. The function of this apparatus is to cool the gas down to such a temperature that the ammonia is condensed. The cooling effect is obtained by means of water which flows through enclosed coils and the temperature is maintained at some point between 120 to 150 degrees F. The automatic controlling instrument, whose bulb is inserted in the gaseous flow at the outlet of the condenser and whose actuated valve is located on the water line entering or leaving the condenser, effects accurate temperature conditions in the condenser, so that the cooling process is properly carried out. The process becomes regular and uniform, labor and water costs are reduced and the certainty of absolute, accurate and ever-vigilant control is afforded.

Automatic control can also be used with good results in the secondary condenser, the instrument being set at a temperature between 60 and 100 degrees F in this case. When a third and final condenser is used, the same automatic control can be secured.

Control of Purifier Boxes

Another interesting application of temperature control is on the purifier boxes. As is well known, these boxes are exposed to all sorts of weather when they are located, as they frequently are, out of doors. This practice is generally adopted by the small gas works, which form as much as 60 per cent of the entire industry. There is accordingly considerable likelihood that the moisture, which is contained in the iron hydroxide and the sawdust filled into the purifier boxes, will freeze in cold weather. The boxes then become useless. This is particularly true in the small gas works, for there the purifiers are operated just for eight to ten hours and then shut down overnight. It is essential to heat up the iron hydroxide the next morning, before the purifiers can be used, and this is a laborious and troublesome operation. It is advisable to install a steam heating coil in the bottom of these boxes and to pass steam through the coil all night long, the flow being controlled by means of a temperature regulating instrument of the "Singl-Duty" type. The bulb of the instrument can be conveniently inserted through the side of the box into the hydroxide mass and the bulb is located on the steam line. The instrument will keep the temperature of the hydroxide between 45 to 60 degrees F., no matter how low the temperature will drop during the night, provided of course steam pressure is available, which is naturally a condition that must be fulfilled in all temperature control.

Control of Holder Cup Temperature

The gas engineer pays considerable attention in the winter time to the water in the holder cups to see that it does not freeze. This is, of course, a very important matter and a man or two is generally assigned to watch the recording thermometers and manipulate the hand valve to see that the temperature of the water does not drop too low. Automatic temperature control is also eminently effective in this case, for the controlling instrument may be connected at the water heater, which may be fired with gas or other fuel, and when properly adjusted it will prevent the temperature of the water from dropping below a definite minimum. It furthermore promotes the economy of the heating process, reduces the labor cost and possesses other similar advantages.

A problem with which every gas works is concerned is the removal of the water from the tar recovered in the plant. This is particularly true in the case of water gas tar. Many processes and apparatus have been proposed and used for this purpose. One of these involves the use of a separator of the kind used in separating cream from milk. In operating this apparatus it has been found essential that the emulsion of tar in water enter the machine at a definite temperature, namely 175 degrees F. Otherwise dehydration of the tar is not accomplished. Here again is a very good opportunity for the plant engineer to use an automatic controlling instrument which he can rely upon to maintain the temperature of the tarry emulsion, as it leaves the heating apparatus, usually a tank with a steam coil in the bottom, at the proper point.

It is also necessary to mention that the common chemical operation of distillation which is carried out in many gas works on recovered ammonia liquor and

in certain cases on the tar and benzol stills can be readily controlled by means of an automatic instrument. The general practice is to insert the bulb in the outlet and the valve on the steam line. Heating hot water is also another possible application for temperature control.

Removal of Naphthalene and Gum Forming Constituents from Gas*

A. R. Powell[1], *M. Merritt*[2] *and J. F. Byrne*[3]

THE subject of naphthalene removal is now becoming one of increasing importance, since the higher heats of the ovens and retorts for coal gas manufacture and of the carburetters for water gas manufacture tend to produce more naphthalene in the gas than formerly.

Another common source of trouble in the distribution system is gummy deposits, which give particular concern in pressure regulators and consumer's meters. Dr. R. L. Brown of the United States Bureau of Mines has traced down the constituents of the gas which form gummy deposits, and has found that indene and related compounds are responsible.

It has been shown that these gum-forming constituents give the characteristic picric acid reaction, which is used in the determination of naphthalene. Consequently, the material generally reported as naphthalene is actually naphthalene plus gum-forming constituents.

Characteristics of a Satisfactory Naphthalene Scrubber

A satisfactory naphthalene scrubber not only must practically eliminate naphthalene from the gas but it should remove the gum-forming constituents as well. It should be capable of handling large or small volumes of gas as desired. It should have no cumbersome moving parts. The labor requirements should be nil. The ground space required should be small. The heating value of the gas must not be reduced. The back pressure should be low. The total cost of materials, maintenance and operation must be small per thousand cubic feet of gas treated.

The naphthalene removal apparatus described here meets these requirements and has demonstrated its effectiveness and practical usefulness in nine installations, on both coal gas and carburetted water gas, ranging in capacity from 2 million to 30 million cubic feet of gas daily. Considerable progress has been made during these two years in simplification of design and addition of automatic features so that the latest Koppers Company type naphthalene scrubbers which are now in process of construction, are far and away the last word in equipment for these purposes.

In this apparatus the naphthalene and gum-forming constituents are absorbed from the gas by light gas oil. The amount of oil required for efficient scrubbing is surprisingly low and the reduction in the heating value of the gas is too small to be measured.

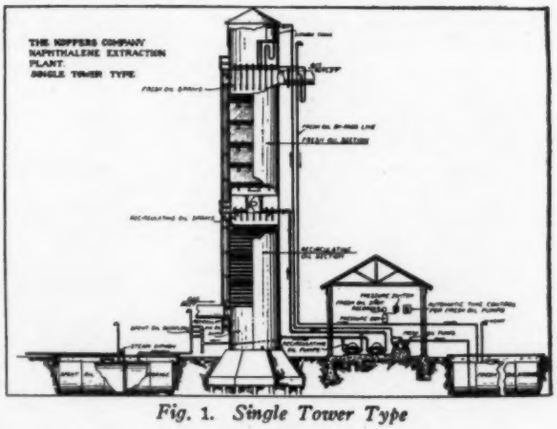

Fig. 1. Single Tower Type

General Description

This naphthalene scrubber consists essentially of two parts, viz., a primary or recirculating section and a secondary or fresh oil section. In the larger plants the secondary section is mounted on the primary section in a single tower, as shown in Fig. 1. In the smaller plants, or where it is undesirable to employ a tower of considerable height, the two sections may be in separate towers or may be combined in a single tower having a vertical partition separating the recirculating compartment from the fresh oil compartment.

This latter type of construction is shown in Figure 2. This type of scrubber is particularly adapted

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* Abstract from a paper read before the Canadian Gas Assn., Toronto, Can., June 16-17, 1927.

[1] The Koppers Company, Chicago, Illinois.

[2] Western Gas Construction Company, Fort Wayne, Indiana.

[3] The Koppers Company, Pittsburgh, Pa.

to small plants, and was designed for this purpose by the Western Gas Construction Company.

The following description applies to the single tower apparatus as installed at Seaboard By-Product Coke Company and Chicago By-Product Coke Company plants, where the fresh oil section is superimposed on the recirculating section.

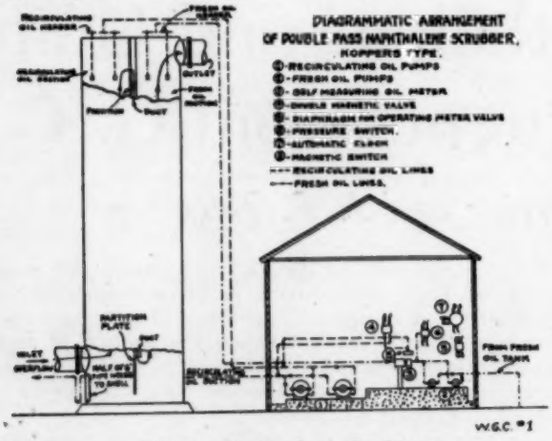

Fig. 2. Double Pass Scrubber

Gas enters the scrubber near the base and passes, counter-current to the oil flow, first through the primary or recirculating oil section. Next it passes through the secondary or fresh oil section and finally through the gas outlet, near the top of the tower. The apparatus is provided with a special packing designed to insure the intimate contact between gas and oil so necessary for effective scrubbing, and at the same time to give very little back pressure.

Small amounts of fresh oil are periodically distributed over the packing in the upper section. This oil passes slowly downward through the fresh oil section, being spread out by the enormous surface of the special packing employed. The final scrubbing of the gas is effected in this section. On reaching the bottom of the fresh oil section, this oil enters the primary section and joins the oil which is there being constantly recirculated at a relatively high rate. The recirculating oil drains into the sump at the base of the tower, whence it is again pumped to the top of the recirculating section.

Function of Recirculating Oil

The naphthalene and gum-forming constituents of the gas are reduced by the recirculating oil to an amount which can be entirely removed by the fresh oil in the upper section. The oil from the upper section, furthermore, continually freshens the recirculating oil, so that the efficiency of the lower section remains practically constant. Spent oil from the bottom of the recirculating oil sump is discarded at a regulated rate, so that the height of the oil in the sump remains fixed at the desired level.

The general operation of the type of scrubber shown in Figure 2 is practically the same as the large single tower apparatus, which has just been described. In this type the gas flows from the top of the recirculating oil side to the bottom of the fresh oil side through an internal duct built along the tower partition.

Mechanical Features of the Koppers Company Naphthalene Scrubber—Introduction of Fresh Oil

The quantity of fresh oil used is so small that it is impossible to obtain satisfactory distribution with any system of constant flow. Hence the fresh oil is charged periodically in small quantities, but at a high rate, through a manifold or spray-header, to the individual sprays. Since the delivery of fresh oil is periodic and continuous for a very short interval, each delivery is called a "shot."

Two different systems have been developed for accomplishing this. The automatic siphon system is applied to the typical scrubber shown in Figure 1. The automatic meter system is shown on the scrubber in Figure 2. Both systems are entirely automatic and require absolutely no attention after being set in operation.

Where the automatic siphon system is installed, the fresh oil from storage is pumped into the siphon tank located on the top of the scrubber. When the level of the oil in the siphon tank reaches the necessary height, the oil is injected into the spray header which, in turn, delivers it to the individual sprays. The spray header stands always full of oil. Consequently, when the siphon acts, oil is delivered from all the sprays simultaneously.

In the automatic meter system, the fresh oil is delivered directly to the spray-header, after passing through an automatic self-measuring oil meter which can be set for any desired quantity of oil per shot.

Automatic Control of Fresh Oil

The control of the fresh oil shots both as to volume and frequency is entirely automatic. A time switch, adjustable to any interval from five minutes to two hours, starts the motor for the fresh oil pump.

In the case of the siphon system, the delivery of oil from the siphon to the spray header, when the shot is made, actuates a pressure mechanism that shuts off the fresh oil pump. With the automatic meter system, the meter automatically shuts when the proper amount of oil is delivered and the pump is stopped. The meter gives a record of the total amount of oil used and also the number of shots made. With the siphon system, the pressure that actuates the stopping of the fresh oil pump also makes a record on a recording pressure gage.

Removal of Spent Oil and Water from Recirculating Oil Sump

The fresh oil introduced into the upper section of the scrubber eventually joins the recirculating oil, both freshening it and increasing its volume. An overflow is provided for the recirculating oil sump, so that a constant level of oil will be maintained

here. The overflow connects to the bottom of the sump so that any water condensed from the gas, as well as excess oil, will be removed.

Water and excess oil drain to the spent oil storage tank. Here the water is removed by a steam siphon connected to a line reaching to the bottom of the tank. When the oil level is reached the siphon action automatically ceases.

Disposal of Spent Oil

Spent oil, containing naphthalene and gum-forming constituents is readily disposed of. In many plants it is used for the carburetting of water gas. The resulting gas shows no increase in naphthalene content. In some cases the oil is stripped of light oil before being run to the water gas machines. The spent oil can always be sold for fuel oil, provided undue cooling does not occur when may cause naphthalene to crystallize out. The fact that the spent oil contains a high percentage of benzol, naphthalene and resin-forming substance, should make distillation for the recovery of these products profitable.

Effect on the Heating Value of the Gas

Although the amount of benzole in the spent oil is high, the loss of heating value of the gas is undetectable on account of the very small volume of oil used. Mr. A. A. Kohr has demonstrated, from extensive data on the gas entering and leaving the naphthalene scrubber at the Seaboard By-Product Coke Company, that the loss in scrubbing 540 B.t.u. coal gas down to 2.67 grains of naphthalene per 100 cubic feet of gas is too small to be detected.

A unique advantage of the Koppers Company naphthalene scrubber is the very low back pressure it throws. The coal gas scrubber at the Chicago By-Product Coke Company, treating 25 million cubic feet per day throws 2.0 inches back pressure. The other plants have a pressure drop of not more than 2.0 inches of water, when operating at full capacity.

Naphthalene Scrubber as an Aid in Gas Purification

Not only does the removal of naphthalene eliminate, to a large extent, stoppage in the distribution system, but also facilitates the purification of the gas whether oxide boxes or liquid purification processes are used. Naphthalene deposited in the oxide boxes increases the back pressure so that frequently the oxide must be replaced before it is completely fouled. Tar in the oxide boxes not only increases the back pressure but also decreases the efficiency of purification.

The Koppers Company scrubber removes naphthalene and also reduces the tar content of the gas to such an amount that increased back pressures due to tar and naphthalene in the boxes are eliminated, and the oxide efficiency is increased.

As a concrete illustration of this fact, some figures from the Chicago By-Products Coke Company are of interest. Average back pressure in the boxes for a period of over a month just before the naphthalene scrubbers were put into operation was 18¾ inches. After eight months operation of the scrubbers, average back pressure dropped to 14¾ inches, or a decrease of 21 per cent. The average flow for these two periods was the same to within a small fraction of one per cent.

Effect of Temperature on Naphthalene in Gas

The carrying capacity of gas for naphthalene increases rapidly with increased temperatures. Mr. R. H. Dickson of the Standard Development Company has compiled the following table. The figures indicate the grains of naphthalene per 100 cubic fee. of dry gas measured at 0° C. and 760 mm. Hg.

Temperature		Carrying Capacity
Centigrade	Fahrenheit	Grains
0°	32°	2.1
5	41	3.3
10	50	6.1
15	59	10.6
20	68	17.1
25	77	28.6
30	86	40.8
35	95	64.6
40	104	99.4

It is evident that with lower gas temperatures a smaller amount of oil will be required for the same naphthalene removal. Adequate cooling capacity before the naphthalene scrubber will reduce the cost of operation and increase the efficiency of the scrubber.

Functions of the Two Sections of the Koppers Company Scrubber

The two gas scrubbing compartments of this naphthalene scrubber are both very essential to successful operation.

The primary compartment, where the recirculating oil scrubs the gas, has a number of important functions. The large volume of partly spent oil in circulation evens out the fluctuations in the amount of naphthalene in the gas so that the fresh oil in the secondary section can finish the scrubbing under nearly uniform conditions, as far as naphthalene content is concerned. It is clearly evident how important this is, when it is considered that the naphthalene content of gas from a water gas plant may vary from 10 to 40 grains per 100 cubic feet in a period of twenty-four hours. Under such conditions the recirculating oil of the primary compartment cuts off the peaks of the naphthalene content of the gas, and allows the fresh oil to take up the remainder of the naphthalene under an even load. If the primary section were not included in the scrubber, fluctuations in the naphthalene content of the inlet gas would cause fluctuations in the outlet gas, and the purpose of the scrubber would be largely defeated.

Another function of the primary compartment is the removal of a large portion of the tar fog present in the gas. It has been found that this tar will not remain in the packing of the primary section, but is continually flushed out by the flow of the recirculating oil.

One of the essential points in the operation of the Koppers Company naphthalene scrubber is that condensation of water inside the scrubber be prevented as far as possible. This means that the gas should not be permitted to cool to a temperature below its dew point while passing through the scrubber. The recirculating oil provides a very good medium for warming the gas slightly so as to prevent this. Steam coils in the recirculating oil sump maintain the temperature of the oil slightly above that of the inlet gas. More steam will, of course, be required in winter than during the summer months, but the maximum cost for this item should not exceed 0.015 cents per M cubic feet of gas scrubbed.

The secondary compartment has only one function. The passing of the gas over surfaces covered with absolutely fresh oil before the gas leaves the scrubber insures the removal of the naphthalene and the gum forming constituents down to a point that could never be reached with other than fresh oil.

Operating Results

The general satisfactory results obtained in the Koppers Company naphthalene scrubber are evidenced by the actual operating data on the coal gas scrubber at the Seaboard By-Product Coke Company, and the coal gas scrubber at the Consumers Power Company, Peoria, Illinois.

Seaboard By-Product Coke Company Coal Gas Naphthalene Scrubber Average of Daily Data for July, 1926

Gas—M cu. ft. per 24 hours	22,800
Oil—Gallons used per million cu. ft.	16.5
Number of shots per 24 hours	16.3
Gallons of oil per shot	23.0
Per cent light oil in spent oil	6.45
Gallons spent oil per million cu. ft.	17.6
Temperature of inlet gas—°C.	22
Naphthalene content—outlet gas—grains per 100 cu. ft.	3.65
Naphthalene content—inlet gas (approximate) per 100 cu. ft.	20

Consumers Power Co., Peoria, Ill., Average of Daily Data for Two Months' Operation

Gas—M. cu. ft. per 24 hours	-2750
Oil—Gallons used per million cu. ft.	40
Number of shots per 24 hours	27
Gallons per shot	4.1
Gallons recirculated per hour	2250
Gallons recirculated per M cu. ft.	19.5
Per cent light oil in spent oil	12.9
Temperature—inlet gas °C.	31.0
Naphthalene Content—	
Inlet gas—grains per 100 cu. ft.	21.2
Outlet gas—grains per 100 cu. ft.—less than	1.0

At the Seaboard plant, the naphthalene content of the gas is reduced to 4 grains per 100 cu. ft. with the use of only 16.5 gallons of fresh oil per million cubic feet, due to the low temperature of the gas. The conditions under which the Seaboard plant operates do not demand a naphthalene removal to less than 4 grains per 100 cubic feet. However, it is very easy to bring the naphthalene content much lower than this simply by increasing the amount of fresh oil supplied.

Operating results from Peoria illustrate the remarkable efficiency obtained with the naphthalene scrubbers of small capacities. With gas at 31° C. practically complete naphthalene removal is obtained with 40 gallons of fresh oil per million cubic feet of gas.

At Peoria a water gas plant is operated in conjunction with the coal gas plant. The spent oil is but a small portion of the total gas oil requirements. Consequently there is no objection in the matter of costs to the greater amounts of oil used. However, if for any reason it is desired to restrict the volume of fresh oil used, efficient scrubbing can be obtained by sufficiently cooling the gas before it reaches the scrubber. This is the practice at the Seaboard plant. Twenty gallons per million cubic feet of gas should give a satisfactory reduction in naphthalene when the gas enters the scrubber at 20° C., and 40 gallons will be required when the gas is at 30° C.

Operating Costs

The cost of operating the naphthalene scrubber at the Seaboard By-Product Coke Company is as follows:

	Dollars per day	Cents per M. cu. ft.
Debit		
Labor Cost—3 men, 8 hours—50% of the time at $0.60 per hour	$ 7.20	0.029
Material—Oil—17.5 gal. per million cu. ft. at 6.01 cents per gallon	26.30	0.105
Power—2.76 k. w. at 1.5 cents per k. w. hr.	0.99	0.004
Total Cost	$34.49	0.138
Credit		
Material—Spent Oil—20 gallons per million cu. ft. at 6.01 cents per gallon	30.05	0.120
Net Cost	$ 4.44	0.018

The figures below for the Peoria plant illustrate the low operating cost for a small plant with almost perfect scrubbing.

	Cents per M.	
Debit		
Labor	0.015	
Power and maintenance	0.031	
Oil—40 gal. /MM at 6 cents/ gal.	0.240	
		0.286 cents
Credit		
Spent oil plus 12.9% light oil 45.16 gal. /MM at 6 cents/ gal.	0.271	
Net cost per M.		0.015 cents

In addition to the above items a charge should be made for steam used to warm the recirculating oil to a temperature above that of the inlet gas, to eliminate condensation of water. As exhaust steam could be used for this purpose, the cost should not exceed 0.015c. per M. cu. ft. of gas.

Advantages of Removing Naphthalene from Gas

Distribution stoppages are reduced and deposits in consumers meters are eliminated. Purification

costs are lowered and operation facilitated by lower back pressures. Higher temperatures in the retorts or ovens for coal gas and higher carburetter temperatures for water gas can be maintained, resulting in greater gas yields and better cracking efficiencies.

Advantages of the Koppers Co. Naphthalene Scrubber

The advantages found by the experience of the past two years of operation of the Koppers Company naphthalene scrubber may be briefly summarized as follows:

1. Simplicity; high efficiency.
2. Small ground space.
3. No heavy moving parts, resulting in low maintenance and long life.
4. Automatic control eliminates operating attention.
5. Small pressure loss through apparatus.
6. No loss in heating value of gas.
7. Surprisingly small amounts of scrubbing medium are required.
8. Spent oil can be used for carburetting water gas, or otherwise readily and profitably disposed of.
9. Naphthalene removal continues for a considerable period, with slowly decreasing efficiency following a temporary shut down.
10. Small initial investment and long life.
11. Very low operating costs.

Impending Changes in Our Use of Fuels*

Arthur D. Little, Chem. D.
Vice-Chairman, Engineering Foundation Board

(Concluded from July 2nd issue)

Beneficiation of New England Coals

The fuel problem in New England has been for years acute, despite the fact that there are great stores of coal in Massachusetts and Rhode Island. It is true that some people think it functions better as material for crucibles than on the grate. Nevertheless, even the diamond will burn if you go about it properly, and so will these New England coals. They are very high in ash, but that ash can be reduced to 7 or 8 per cent. They are very low in volatile, but the volatile content can be raised. Both operations are in fact now going on.

We have all, from time to time, in recent years, heard much of the Trent process. You recall that in that process high-ash coal is subjected to wet grinding and thereafter agitated in a large volume of water, to which a moderate proportion of fuel oil has been added. The oil selectively wets the coal and gathers its particles into little balls not unlike caviar in appearance. The ash, for the most part, remains with the water and is washed away. The product of the de-ashing process is a putty-like amalgam containing about 8 per cent water, 10 per cent oil, and the balance as low-ash coal.

For various reasons this amalgam has failed to find acceptance as fuel for either domestic or power purposes. Quite recently, however, the process has been further extended, and the results obtained are of the most serious interest to New England and to the operators of anthracite mines.

In the process as now applied to Rhode Island coal and anthracite culm the amalgam is extruded and cut to briquette size. The briquettes are then baked under regulated temperature conditions, which permit the recovery of the major portion of the oil. The finished briquettes are equal, if not superior, to anthracite as a domestic fuel. They are of uniform size, dense, very hard, low in ash, and with about 8 per cent volatile. They ignite readily, burn freely without smoke, and hold the fire for a long period with maintenance of their shape.

Of less immediate practical importance in this country, though of greater interest in its far-reaching implications, is the process of Bergius for the conversion of coal to liquid fuels. In the plant at Manheim pulverized coal, made into a paste with oil, is heated to about 450 degrees Centigrade in an atmosphere of hydrogen under a pressure of 1,800 pounds or more to the square inch. The coal is thereby largely converted into oil and tar, from which motor fuel, Diesel oils, lubricants, and heavy fuel oil are recovered. The crude yields and the character of the products are largely influenced by the nature of the coal used and vary from 93 to 140 gallons per ton of dry, ash-free coal.

Research and Tradition in the Gas Industry

J. E. Bullard has recently pointed out that "the real competition in which the gas industry is involved is that between research and tradition." He continues: "Unless real research work is done and on a scale commensurate to that being done by competing industries, then the gas industry can take it for granted that it will have to relinquish more and more of its profitable business."

It is a timely warning, for the gas industry is entering upon a period of great expansion, in which the highest technical and scientific knowledge will be essential for the solution of the problems and the improvement of the opportunities which are before it.

*Abstract of a paper presented at the meeting of the Engineering Foundation, N. Y. C., May 19, 1927.

The most significant of the developments immediately facing the industry are perhaps house heating and a greatly extended industrial use of gas. In case of both, gas offers the simplest and most reliable of the present systems of automatic heating. It can be burned at high efficiencies. The distribution of gas in underground mains is unaffected by weather or traffic conditions, and the service is among the most dependable of the utilities. Use of gas involves the consumer in no carrying charges. He pays for his fuel after it has been used. Under present conditions the householder pays more, but he receives more in comfort and convenience. In many industrial operations, however, the greater economy of gas is readily demonstrable.

The use of a gas flame to cool the refrigerator sounds paradoxical, but it may be recalled that wherever a motor-compressor unit is producing refrigeration a coal pile is somewhere being consumed to develop the electrical energy which drives the motor. Refrigeration by the direct use of gas thus eliminates a long chain of intermediate equipment. The required energy is furnished in much cheaper form; the apparatus involves neither motor, moving parts, nor lubrication. It makes small demand for service. Despite its present subordinate position in the art, the future of household refrigeration would seem to belong to the gas-fired unit.

Complete Gasification

Since gas has the highest form value of any type of fuel, a problem of outstanding importance to the gas industry is that of developing a thoroughly commercial method for the complete gasification of coal on the grand scale. The problem is apparently nearer to solution in England than with us. There some two hundred Tully plants are operating, but they are mostly of small capacity, making less than 500,000 cubic feet per day. In this process the coal is first carbonized in a vertical retort, set over a water-gas generator, into which the coke descends. The retort is heated externally by the blow gas and internally heated by the water gas generated during the "up runs." The yield of mixed or double gas per ton of coal varies from 40,000 to 53,000 cubic feet of 350 B.t.u.

Among those methods of complete gasification which have come into less general use mention should be made of the Kreisa system operating in Germany and Austria. It somewhat resembles the Tully process, but yields a gas of 450 B.t.u., provides for the continuous removal of ash, and, in place of a boiler for generating steam, utilizes a metal checker-work, which, heated by the gases of the blow period, and thereafter sprayed with water, provides, in balanced proportion, the steam required for the run.

Our smaller municipal gas companies are too often antiquated organizations, without vision, and far from realizing, either in their present practice, or in their preparation for the future, the possibilities of the industry. In many cases their communities could be more effectively and cheaply served through high-pressure transmission lines from large central gas plants. Natural gas is now piped 300 miles, and a projected line from the Texas Panhandle to Kansas City will be 450 miles in length. It is designed to deliver 36½ billion cubic feet a year at a maximum pressure of 450 pounds.

In the Chicago district, along the Atlantic seaboard, and at a few points elsewhere, there exist great markets for manufactured gas within much shorter distances from the mines. There are few locations where adequate condensing water for super-power plants is available at the mine, but super-gas works are not subject to this limitation.

Gas Developments Abroad

We shall do well, therefore, to watch the development of projects now under serious consideration in Germany for concentrating in the Ruhr the entire gas industry of the country and effecting distribution through high-pressure lines. We may find much food for thought in the following statement of the ambitious program of the Coal Utilization Company of Essen:

"Contrary to press statements that the new company is not concerned with the chemistry of coal, I must say here that its field is unlimited. It will use mechanical, electrical and chemical methods to arrive at its object. All processes which use water, air and coal as raw materials belong to the activities of this company. Coal which is otherwise unsalable must be changed to other forms of energy or to other materials for which there is a market. It is natural that the new company cannot begin at once all the methods of work. Its activities will be divided into those which can be immediately applied and those which must be left for the future. In the first class belong the distant supply of gas, district heating, the application of coal distillation, gasification and firing of powdered coal. For the future there are those modern chemical processes which have coal for their raw material but which require further scientific study and which before technical application is possible must be submitted to extensive investigation."

The modern chemical processes referred to are presumably those which Bergius, Fischer, and Patart described.

Welding Solves Leakage

Coke-oven gas is already being distributed over a radius of 62.5 miles from the Ruhr. They believe that the problem of leakage over much longer lines under higher pressures "is entirely solved by processes for welding the gas lines."

In the Rhine-Westphalia coal district it is proposed to build a gas-collecting system which will extend from Hamborn to Hamm, into which the several coke-oven plants will pump their gas. This pipe line will follow the water courses through the coal district. The purification of the gas will be made at the end of the collecting system, where there will be located the gas holders and compressing station.

It is claimed that the transmission of gas in great volume by pipe line is much less than the transport of coal by rail to local gas works, and in view of other savings it is planned to have one basic price for gas for the whole country. The distant gas transmission will, it is believed, be subject to the same economic laws as high-tension electric transmission.

In connection with this general plan much importance is attached to the possibility of utilizing cheap oxygen in water-gas sets, which would thereby operate continuously with a mixture of oxygen and steam. Our own studies indicate that such a generator might easily use 25 per cent less fuel for a given output and have twice the capacity from given size. Such operation would permit the use of a solid hearth with slag removed in liquid form, thereby saving grate troubles and clinkering and making available low grades of coal with a low fusing ash.

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INDUSTRIAL DIVISION MEETING, NEW ENGLAND GAS ASSOCIATION

ABOUT 125 gas men attended the annual meeting of the Industrial Division, which was held at the Riverbank Court Hotel, Boston, at 12:30 o'clock on Friday, June 24. This meeting marked the close of the Industrial Gas Course at M. I. T. and all the members were present.

R. J. Phelon of Worcester presided, with J. J. Winn, Jr., of Fall River as secretary.

The secretary's annual report showed the division now has an enrollment of 103 members. Six meetings were held during the past year, with an average attendance of 62.

President Phelon told how the present Industrial Division originated from the first Industrial Gas Course held at M. I. T. six years ago and outlined some of the work which has been accomplished since that time. The President thanked the officers and directors for the co-operation they had given him during his term of office.

New Officers

The following officers and directors were elected for the coming year: President, E. W. Berchtold, of the Boston Consolidated Gas Co.; vice-president, J. J. Winn, Jr., of the Fall River Gas Works Co.; secretary-treasurer, L. E. Wagner, of the Providence Gas Co.; board of directors, C. H. O'Donnell, of the Lowell Gas Light Co.; L. B. Crossman, of the Surface Combustion Co.; H. S. Brasseur, of the Haverhill Gas Light Co.; A. B. Rodgers, of the Norwood Gas Co.; S. F. Morgan, of the New Bedford Gas & Edison Light Co., and G. E. Stephens, of the Worcester Gas Light Co.

On behalf of the Industrial Gas class, H. J. Ayling presented testimonials of appreciation to Professors Wilkes, Bates, Prescott and Dr. Williams.

J. Paul Leinroth, Chairman of the Educational Committee of the A. G. A. Industrial Section, said New England gas men were to be complimented on their foresight in establishing at M. I. T. the first industrial gas course in the country. The success of this educational work has resulted in the establishment of similar courses in other sections of the country. This year the course was conducted with the cooperation of the American Gas Association and, for the first time, students were solicited outside of New England. Twenty-five men enrolled and of this number about half were representatives of gas companies located away from New England. Mr. Leinroth stated that the policy inaugurated this year, to have separate courses for the engineering and sales phases of the work, will be continued. The course just finished at M. I. T. consisted wholly of engineering fundamentals, while the course to be held in New York will deal only with the selling of industrial gas.

Members Urged To Attend Meetings

E. W. Berchtold, the new President, urged the members to make every effort to attend the meetings held during the year and asked them to submit any suggestions they might have relative to the type of meetings desired and subjects they wished discussed.

Two of the students enrolled this year came a long way to attend the course. They were W. A. Hudson, of the Birmingham Electric Co., Birmingham, Ala., and C. T. Yates of the Central Arizona Light & Power Co., Phoenix, Ariz. Both of these men said they were fully compensated for their long trip, not alone from the knowledge gained in the classrooms but in their contact with other industrial men in the course. They learned a great deal by exchanging experiences with them.

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GAS HEAT PROCESS MAKES DURALUMIN AVAILABLE FOR ALL-METAL AIRPLANE

Special gas-heat processes have made duralumin available in the construction of all-metal airplanes which may make possible a thirty-six hour flight between New York and Berlin, says the Pennsylvania Public Service Information Committee. Duralumin is a patented aluminum alloy discovered by A. Wilson, Berlin, Germany. It is not easily corroded and is as strong as steel.

One of the most remarkable characteristics of duralumin is its plasticity. It may be heat treated in chunks before it is forged or machined into its finished shape. Shaping processes, however, must be carried on within a few hours after heat treating, as the metal then begins to harden and reaches its maximum hardness in about ten days.

About ninety-six per cent of duralumin is aluminum and the remaining ingredients are copper, magnesium, manganese, silicon and iron. The metal is treated in gas-fired furnaces where it is brought up to a temperature of about 968 degrees Fahrenheit and plunged into ice water, after which it immediately begins to harden. During the first few hours, however, it can easily be shaped.

Cements for Gaseous and Liquid Hydrocarbons*

F. W. Sperr, Jr.

Director of Research, the Koppers Company, Pittsburgh, Pa.

THE list of cements ordinarily used in the gas and petroleum industries, in apparatus handling gaseous and liquid hydrocarbons, is short and simple. Only rarely does the plant technologist have to resort to other than the following materials familiar to every operator.

1. Red lead or white lead and linseed oil for "doping" screw joints. Oil-graphite mixtures are sometimes substituted.
2. Shellac has excellent resistance to the petroleum hydrocarbons at ordinary temperatures and is used for doping pipe threads in gasoline recovery plants.
3. Portland cement for gas main joints and miscellaneous repair purposes.
4. Litharge and glycerine—used principally for repairs or special joints in apparatus handling liquid hydrocarbons, or the vapors of such hydrocarbons.
5. Rust joint cements—usually consisting of iron filings and ammonium chloride—are sometimes used, although the writer has no direct knowledge of their application in these industries outside of the boiler plants.
6. Miscellaneous plastic materials, e. g., soap and clay, are employed in gas distribution systems for temporarily sealing breaks in mains.

A number of other materials, having excellent cementing properties, might well be employed; but so far as the writer knows, their use in the gas and petroleum industries is very limited. Among these are the glue base cements and sodium silicate compositions. We are not here concerned with the frequent application of the latter in refractory compositions.

Outstanding Requirement

The outstanding requirement for the cements listed above is resistance to the action of such substances as the benzol hydrocarbons, gasoline and the heavier petroleum oils. This applies to the cements used for gas apparatus and piping, as well as those employed in the handling of oils. Most manufactured gas contains benzol hydrocarbons in the form of vapor, ordinarily equivalent to 0.2 to 0.4 gallons per thousand cubic feet. The use of rubber compositions in permanent apparatus for handling such gas may be unsatisfactory on account of the great capacity of rubber for absorbing the benzol. Natural gas in certain districts may carry considerable amounts of gasoline vapor. L. C. Lichty† makes the following statement:

"With the development of natural gas in the Mid-Continent field, it was found that rubbers ordinarily used were affected by the gasoline in the gas and were of comparatively short life. Gasoline proof rubbers were developed and practically all lines laid with these rubbers have given very little trouble. These rubbers have a tendency to enlarge when saturated with gasoline, and, in this way, make a very tight joint. On a pipe line system in California it was found, after a gasoline plant had been installed, that leaks occurred along the line due to shrinkage caused by the rubbers drying out. It became necessary to by-pass the gasoline plant occasionally and allow the rubbers to become saturated with gasoline until they had swelled sufficiently to shut off the leakage."‡

Dopes May Be Lubricants or Cements

The dopes used for screw joints in pipe fitting may be primarily lubricants or primarily cements. To the first class belong the mixtures of graphite and mineral oil employed for low pressure piping in oil refineries. Such lubricating dopes are particularly advantageous where piping must be frequently disconnected, but their employment requires that the threads be coated carefully and the connections pulled up tight.

The common cementing or sealing dopes are mixtures of red lead or white lead and linseed oil. Iron oxide is sometimes mixed with the lead. It is said that litharge with linseed oil makes a stronger joint, but the writer has seldom seen this mixture used, litharge and glycerine being usually preferred for a very hard permanent joint. The freshly applied linseed oil dopes are, of course, soluble in hydrocarbon oils, and in pipe lines for conveying such oils, sufficient time should be given for the setting of the dope before the lines are put into service. This is usually of little importance in gas piping.

Shellac Can Be Used at Ordinary Temperatures

At ordinary temperatures shellac is an excellent material to withstand the action of gasoline, as is attested by its use for coating cork floats in certain types of carburetters. Dr. R. W. Miller advises that it is generally used for doping pipe threads in plants recovering gasoline from natural gas. Shellac is not so suitable in connection with the handling of the benzol hydrocarbons. When motor fuels con-

* Read before American Institute of Chemical Engineers, Cleveland, Ohio, May 31-June 3, 1927.

† Natural Gas, by L. C. Lichty, 1924 edition. New York: John Wiley & Sons, Inc.

‡ In this connection, Mr. W. A. Gruse calls attention to the possibility that the action of natural gases from different fields may be attributable more to changes of sulphur content than to the hydrocarbons present. "It is apparently true that the non-benzene hydrocarbons of a certain boiling range do not differ much from benzene in solvent action towards rubber. It is also more or less true that natural gas in the Mid-Continent field and in California is likely to contain more sulfur compounds than the Eastern gas."

sisting of benzol or mixtures of benzol and gasoline came on to the market, a great deal of trouble was experienced with shellac coated carburetter floats. Nitrocellulose coatings were found much superior.

For most purposes, where cements have to be used in the gas and petroleum industries, temperature requirements are not severe. For high temperature work, it is the general practice to specify lead or asbestos gaskets, or caulking, or welded joints. The rust joint cements are sometimes convenient in this connection for temporary repairs.

It must at once be admitted that the art of compounding and applying cements in these industries, as in most other industries, is wholly unscientific and very largely on a rule of thumb basis. So far as the writer is aware, no one has ever made a scientific study of the pipe dopes or litharge and glycerine cements as they are applied in every-day practice. Some proprietary compounds are on the market, but usually the mixtures are made up on the job without anv definite proportioning, to the consistency that best suits the individual pipe fitter or mechanic.

References

The technique of gas main joints is, however, of very great importance and has been given much attention. It perhaps deserves special consideration here. Reference should be made to Volume II of Manufactured Gas, by Professor J. J. Morgan, of Columbia University (published by the author, New York, 1926), which gives concise, reliable and up-to-date information on the subject. Walter Forstall's Manual of Gas Distribution (published by the United Gas Improvement Company, 1920), should also be consulted.

Screw couplings with the usual pipe dope are employed almost exclusively for pipe up to 2 inches in diameter and are often used on the larger sizes up to about 12 inches diameter. The type of joint in which cement is employed is the bell and spigot. The principal materials used for caulking such joints are lead and Portland cement. There has been considerable controversy as to their respective merits, and one type of joint employed by the Public Service Gas Company of New Jersey, uses both materials in combination. The present tendency in the gas industry is somewhat in favor of Portland cement for the caulking of bell and spigot joints in mains of 16-inch diameter and under, and cement joints have been used for mains up to and including 30 inches, with a marked saving over lead joints. The cement joints have the outstanding advantage of cheapness, while the lead joints have the advantage of being easier to repair. For the very large sizes of mains, it is possible that a properly applied lead joint may be tighter and more permanent than a cement joint.

Making Up Cement Joint

In making up the cement joint a packing or "yarn" is first driven into the extremity of the joint all around the pipe. This is usually jute or hemp, and is generally preferred free from tar and oil. The yarn should be moistened so that it will not absorb water from the cement.

After applying the yarn, the rest of the space between the bell and the spigot is filled with cement by hand, and rammed into place with a yarning iron or wooden tool of similar shape. Another strip of yarn, coated with cement, is then rammed in and worked just past the groove near the outer edge of the bell. Additional cement is then applied and the joint pointed up. There are thus two layers of yarn enclosing an inner layer of cement, which keeps the joint tight, while the outside layer of cement serves to protect the second yarn.

The cement should be a good, quick setting grade and is often used neat, in the proportions of one part of water to three parts of cement by volume. The Pacific Gas and Electric Company uses a mixture of one part cement with one part of good, clean sand, not too fine and not necessarily sharp. The sand is said to decrease the temperature rise due to the chemical reactions in the setting of the cement. Either for this reason or for its direct tendency in lessening shrinkage cracks, it is thought that the employment of a moderate amount of sand gives a tighter joint.

Use of Flexible Couplings

In the modern gas distribution and transmission systems, much use is made of flexible couplings. The Dresser coupling, which is largely used, employs a gasket, usually made of asbestos and rubber, in varying proportions. These gaskets often have a ring of lead or canvas to protect the composition against the action of the gas.

Practice in repairing breaks in gas mains may also be briefly mentioned. The escape of gas is stopped temporarily by ramming moistened clay or Portland cement into the crack and winding a strip of muslin around the main to hold the material in place. Sometimes soap or pipe dope is used for temporarily stopping the crack. The permanent repair is then effected either by application of a split sleeve or by inserting a new piece of pipe.

The writer desires to acknowledge the assistance of Mr. I. H. Jones, of the Koppers Company, and the helpful suggestions of Mr. W. A. Gruse, of the Mellon Institute, in connection with the preparation of this paper.

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ANNUAL MEETING OF THE COMMERCIAL SECTION, EMPIRE GAS & ELECTRIC ASSOCIATION

THE convention was held in the pavilion located at Roricks Glen on the edge of the Cheming River, June 21st and 22nd.

The first session was opened by an address of welcome by Mr. F. H. Hill, Vice President Elmira Water, Light & Railroad Company. Mr. Hill ably sketched the historical development of Elmira and its environs and cordially welcomed the delegates to this old but interesting portion of New York. He traced the development of Elmira during a 200 year

period up until within a few years of the present time when the growth of public utilities became important. The gas industry as represented in Elmira by 14,000 gas irons, 7,000 water heaters and 3,000 gas ranges seemed to have brought the community to a point of saturation with feeble prospects for further progress outside of replacements.

Gathering Useful Data

A card index of the district was made and each householder in the city was tabulated with information about his income, credit and gas appliances he could use, but had not got. Then a campaign was begun to shoot at what he "had not got." This proved to be the answer to the idea that a point of saturation had been reached.

The Commercial Department has become an important part of the personnel of public utilities of today. There is no longer a deadly routine. The business of getting business is the wonderful thing, and it is upon business of this kind that utilities must depend.

Home Service as a Commercial Department Activity was ably discussed by Mr. R. V. Howes of the Consolidated Gas Company. Among other valuable ideas, he set forth that the Home Service personnel should be considered in the nature of engineers as much so as the industrial engineers.

Home Service from the Gas Company Standpoint was set forth in a paper by Miss Maye Lovell of the Consolidated Gas Company. The subject was discussed by Mrs. Haas of the Kings County Lighting Company. Miss Ruth Soule of The Brooklyn Union Gas Company gave the view of her community which is a city of homes. She told of a departure from the customary methods. This involves the opening of Home Service activities adapted to the life and habits of foreign sections in the community.

Miss Laura Rischman of the Buffalo General Electric Company added a helpful view of Home Service from the standpoint of the electric industry in a well prepared and ably delivered paper.

"Blue Star Home Discussed"

"The Blue Star Home" was thoroughly discussed in a paper written by J. J. Burns of the Laclede Gas Company of St. Louis. Mr. Burns was unable to be present and the paper which also was devoted to the "Red Seal" of the electric companies as well as to the "Blue Star" of the gas companies was read by C. W. Person, Publicity Section of the American Gas Association.

Industrial Gas was given an introduction into the proceedings of the association by a paper "Conversion of Existing Equipment for Use of Gas as a Fuel" by Harry E. Merrill of the Republic Light, Heat and Power Company.

The paper dealt chiefly with the installation of gas into house heating boilers manufactured and heretofore used for other fuel. In order to do this properly it has been necessary to create new burners and special furnace linings for such equipment.

Mr. Joseph W. Piatt of The Brooklyn Union Gas Company followed with a paper upon "Gas in the Baking Industry" which was well received.

Both papers aroused much interest and were the cause of much questioning by those who desired information upon these subjects. The two industrial representatives answered all queries to the satisfaction of their listeners.

A buffet luncheon was served on the grounds and without question this innovation was helpful in maintaining a 100% attendance at the sessions of the forenoon. The luncheon was given by the Elmira Water, Light & Railroad Company.

Visit to Corning Glass Works

The afternoon was given over to golf by those who preferred that sport to visiting the Corning Glass Works. The trip to the glass works, however, took most of the delegates and visitors. They were well repaid for the privilege, for here they saw glass manufacture in all of its phases—glass melting, the creation of beautiful pieces by artists, and the commoner commercial work.

A beef steak dinner was served at the glen in the early evening, after which the meeting settled down to the routine of papers and discussions which followed into a late hour of the evening.

Compensation of Salesmen and Distribution of Selling Expenses between Promotion Sales Accounts by T. P. Federer of the Adirondack Power & Light Corporation was ably handled and it created quite a lot of interested discussion.

A paper "Sale Servicing of Gas and Electric Refrigeration" by G. Bennis, United Electric Light & Power Company focussed the attention of the meeting upon the value of this service along with refrigerator sales.

A splendid paper was read on "Merchandising Progress" by H. C. Wilder. This created much enthusiasm. This practically closed the meeting from the standpoint of gas company interest. The remaining papers of the evening session and those of Wednesday forenoon were concerned with the electric activities of the association. The attendance Wednesday forenoon appeared to include all the gas company delegates, as well as those from the electric companies, which also proved the courtesy of the gas company personnel in spending as much time listening to electric discussions as the electric utilities delegates had done so patiently in the gas discussions in which they did not participate.

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ACCOUNTING DIVISION IS FORMED

New England Gas Association Widens Scope of Its Activities

AT a most enthusiastic meeting, held in Boston on Monday, June 27th, the new Accounting Division of the New England Gas Association came into being. Thirty men, representing more than twenty New England gas companies, gathered in the auditorium of the Boston Consolidated Gas Company's office building to formally organize the new division.

W. A. Doering, of the Boston Consolidated Gas

Company, acted as chairman. Mr. Doering has advocated the formation of an accounting division in New England for a long time and the work of organizing has been done almost entirely by him.

The chairman reported that 38 applications for membership had been received and it is expected there will be at least 75 members enrolled by next fall.

President Gould extended the greetings of the New England Gas Association to the new members and expressed his appreciation of Mr. Doering's fine work in getting the division organized.

Officers Elected

The following officers were elected: Chairman, W. A. Doering of the Boston Consolidated Gas Co.; vice-chairman, R. D. Washburn, of the Gas & Electric Improvement Co.; secretary-treasurer, Otto Price, of the Boston Consolidated Gas Co.; board of directors, Burton Smart, of the Portland Gas Light Co.; A. F. Short, of the Providence Gas Co.; C. V. Dimock, of the New Haven Gas Light Co., and L. F. Kelley, of the Pittsfield Coal Gas Co.

It was moved and voted that the constitution and by-laws of the New England Gas Association be adopted.

The following were appointed to serve as a membership committee: G. S. Lees of the New Haven Gas Light Co., A. W. Chase of the Manchester Gas Co., and A. D. Duff of the Fall River Gas Works Co.

A committee was appointed to investigate the policies followed by various New England gas companies relative to merchandising credits. The committee is composed of A. E. Shaffer of the Boston Consolidated Gas Co., A. D. Duff of the Fall River Gas Works Co., and T. R. Clayton of the Providence Gas Co.

Letters will be sent to the members asking for suggestions regarding topics to be discussed at the meetings. The scope of the division's activities will not be confined solely to accounting problems but will include customer service and other phases of the utility business. Because of this it is expected that many men not especially interested in accounting will be attracted to the new division.

It was moved and voted that the dues would be $5 per year.

The next meeting of the accounting division will be held in September at Portland, Me., on the same date the operating division meets in that city. Two of the subjects decided upon for the September meeting are merchandising credits and gas rates. Arrangement of the program was left in the hands of the board of directors.

After the meeting Mr. Doering conducted the members through the beautiful new office building of the Boston company.

SURPLUS HEAT UTILIZATION POSSIBILITIES IN CANADIAN COAL GAS PLANTS*

W. C. Philpott

Chemist, Consumers' Gas Company, Toronto, Ont.

THIS paper is intended to review the subject of heat losses occurring in coal carbonization, and to describe what is being accomplished in heat recovery.

It may be noted that whilst the attention of plant designers has always been given to the subject of waste heat recovery, it has been only of recent years that their endeavors have extended beyond the point of reducing the fuel used in the bench producers. Scientists had for long pointed out that the actual carbonization process, once started, required very little, if any, added heat for its theoretical continuation, and that therefore the comparatively low fuel consumption attained in modern plants did not by any means bring the heat efficiency of carbonization to a reasonable figure.

Within the last few years, however, with the realization that surplus heat could and should be treated as an important by-product, developments in surplus heat utilization has led to a remarkable increase in plant "heat efficiency."

Where Heat Is Lost

The principal points of heat loss are:

(a) Sensible heat in the waste gases of combustion.

(b) Sensible heat in the discharged coke.

(c) Excess air in benches and flues.

(d) Sensible and latent heat in the gaseous products leaving the retorts.

(e) Radiation and convection losses from the retort benches.

In a general consideration of heat utilization it is obvious that the first consideration in general efficiency is to retain as much heat as possible in the benches, and to return to the benches as much as possible of the heat taken away; in other words, to reduce the actual fuel consumption in the producers to as low a figure as possible.

This desideratum led to the general adoption of regenerator and recuperator arrangements on intermittent carbonizing plants by which the cold air supply for the combustion of the coke fuel could be preheated, and in the case of the continuous vertical retort to the preheating of the secondary air by the heat of the outgoing coke.

Recoverable Heat Limited

The high temperatures of modern carbonizing practice, however, set a very definite limit to the amount of heat so recoverable. The amount of heat still lost under items A and B remained very considerable and affords the greatest opportunity for further utilization.

With regard to the other items, a more liberal use

* Read before Canadian Gas Association, Toronto, Can., June 16-17, 1927.

of insulating brick in bench design, together with improvements in design by which the area of exposed brickwork is decreased have largely diminished losses under Item E, whilst the methods to be adopted for reducing the loss under Item C are fairly obvious. In connection with Item C, however, it is well to point out that it is not sufficient to prevent excess air up to the point of secondary combustion, as any air infiltration beyond this point will affect the efficiency of later surplus heat recovery equipment.

With regard to Item D, the recovery of heat is being accomplished in some plants by using the coal gas condenser as a boiler feed water heater, although so far heat recovery of this item is not very generally practiced.

To come back to Items A and B, the most obvious method of heat recovery is by the generation of steam to supplement or displace the ordinary works boiler equipment and this is the method usually adopted.

First Canadian Waste Heat Boiler

The first waste heat boiler to be adopted in a Canadian gas works was at Victoria, B. C., where a vertical natural draft boiler of the fire tube type was installed with the Glover-West continuous vertical retort plant, the waste gases passing through the boiler to the bench stack. The installation followed general practice in England where Glover-West plants were being equipped with natural draft boilers of either water tube or fire tube design, the boiler generating sufficient steam for "steaming" the retorts and some little surplus.

The tendency in waste heat boiler practice at that time was to follow closely fuel-fired practice, but what was good fuel fired boiler practice was far from ideal for steam raising from waste gases at much lower temperatures. In a paper in 1920, Major Gregson of the Spencer-Bonecourt Company pointed out that a fuel fired boiler was designed to extract the bulk of the heat from the furnace gases by radiation, the conducted heat effect in the boiler itself being small and, in fact, largely left to the economizer. The result was that when such a boiler operates on low grade gases—it being established by Strefan that the radiant heat absorption varies as the fourth power of the absolute temperature—the boiler is "out of balance" and either rejects its gases at a comparatively high temperature or alternatively if an economizer is fitted gives the latter too much to do and results in a great surplus of hot feed water.

The Spencer-Bonecourt Company developed the fire tube boiler as being the better medium for conducted heat absorption, and coupled with it the principle of high gas-flow as developed by Mr. Kirke to obtain a very high extraction efficiency.

Fire Tube Boiler Best for Waste Heat Recovery

The fire tube boiler is now generally recognized as the best type for waste heat recovery, and the majority of modern plants are being equipped with them. This applies not only to continuous vertical retort plants, but also in horizontal retort plants where it is not usual to recover the heat from the discharged coke. In the latter case the amount of regeneration by air preheating is frequently curtailed in favor of increased steam generation.

The first really large scale installation whereby a move was made to arrange a complete gas works so that the whole of its steam power requirements were to be obtained from waste heat boilers was at the Stratford, London, works of the Gas Light and Coke Company.

Steam Production on Glover-West Benches

A paper read in 1923 before the Southern Association of Gas Engineers by Mr. J. S. Thorman, then the station engineer at the Stratford works, gave the following results of steam production on the Glover-West benches.

Actual steam produced at 115 lbs. pressure per lb. of producer fuel fired 2½ per cent moisture, 5.27 lbs.

Actual steam produced per ton of coal carbonized, steam at 115 lbs. pressure, 1,751 lbs.

Extraction efficiency of the Spencer-Bonecourt boilers, i.e., relation between total heat extracted as steam and total heat between limits of waste gas temperature and steam temperature, 90.3 per cent.

The fan power represented under 6 per cent of the boiler output, the electricity used being assessed at 30 lbs. of steam per h.p. hour.

The steam obtained when the retort bench was carbonizing 230 tons of coal per day was 18,500 lbs. per hour from and at 212 degrees F.

Mr. Thomas Hardie, chief engineer of the Gas Light and Coke Company, has in a recent paper before the Institution of Fuel Technology given some interesting light on the extent to which his company has since developed the utilization of surplus heat in their various works. He stated that his company now has 26 waste heat boilers at work on carbonizing plants and a further 11 under erection, plus a further 46 on C. W. G. plants; i.e., a total of 83 boilers in all. Mr. Hardie estimates that these boilers represent a daily steam output of some 4,000 tons, releasing some 600 to 700 tons of coke for daily sale which would otherwise have been used for works purposes.

Other Applications

In addition to the waste heat boilers on the vertical retort benches, the older installation of horizontal benches were also equipped with two similar boilers, and the carburetted water gas sets were made self-supporting by waste heat boilers working on the blast outlet gases.

At these works the waste heat boilers enabled the company to install two high speed steam electric generating sets to replace the gas engine driven ones, all power being obtained from waste heat and the fuel fired boiler battery was shut down.

(To be concluded in July 16 issue)

As The Journal Views It

IS THERE A COAL STRIKE?

The threat of a bituminous coal strike is always one of serious import to the gas industry. There is danger that the strike of 1927, differing in so many ways from those of previous years, may not be duly appraised because of its many novel features. It is, to be sure, neither widespread nor threatening, so far as the gas industry's fuel supply is concerned; but if early settlement is not made we are bound to feel the reaction of it within the gas industry sooner or later in the form of increased coal bills.

At the beginning of the strike there were in the consumer's stocks or en route to consumers more than 80,000,000 tons of coal. This is at least double the normal comfortable stock requirement of the country and at least four times the minimum safe stock. But despite steady non-union production in excess of 8,000,000 tons per week, consumption has been cutting into stocks slowly. The latest estimates indicate that on July 1 the stocks probably did not exceed 60,000,000 tons; thus in three months the supplies of coal in consumers' hands have been decreased by one-fourth. Another three months on the same basis will bring the industry into the fall season with only a normal coal supply above ground; and at that time there will undoubtedly come the usual marked increase in rate of consumption as the heating load develops and little chance to meet it with increased production except at union mines.

There is no indication that the gas industry or other industries are going to suffer any general coal shortage this year, or even early in 1928. However, it is important that gas companies which use bituminous coal take special pains to maintain stocks, perhaps even a little above normal. If this precaution is observed there need not develop later even local cases of shortage; and we must remember that even such local shortages are serious when continuous gas supply may be affected.

Fortunately, the present prices of coal are low and there is no prospect of early increases in price. It will involve no financial sacrifice, therefore, to make sure that the stock pile is maintained and that there is no danger of interruption in fuel supply when the heavier heating loads of fall and winter are experienced. In fact, purchases at the present time can probably be made under more favorable conditions than are likely to prevail after the heating season begins.

A MORAL DEBT THAT SHOULD BE COLLECTED

At the recent convention of the National Electric Light Association Mr. Homer E. Niesz urged that the electric light and power industry make periodic physical examinations of its employees. By such an arrangement the health of any company's personnel would be greatly enhanced and in addition many hours, as represented by sick leave, would be available for productive effort.

Our own industry can well devote some serious thought to the end that some such plan would be formulated to apply to the safeguarding of the health of its employees.

Morally any organization or industry would be entirely within its province in demanding that its employees keep their health status keyed up to the highest possible point.

Such a statement is made with the thought in mind that the law has seen to it that the employer provides sanitary and healthful working quarters for the employees. Further, it has, in many cases, prescribed the length of time various workmen should be occupied at their daily task, to say nothing of the numerous safeguards that have been suggested and installed to eliminate accidents.

It would accordingly seem justifiable that the employer demand that his employees keep their health in such good condition that lost time will be reduced to a minimum.

The future might possibly see the processes of the law demanding such care and foresight on the part of the employee. But in any case the latter morally owes this debt to his employer and it should be collected.

INDUSTRIAL GAS LESSONS

IF IT'S DONE WITH HEAT — YOU CAN DO IT BETTER WITH GAS

Lesson No. 177

Carburetted Blue Gas

IT has been stated that carburetted blue gas or water gas is a mixture of blue gas and oil. Hence we may expect to find that the carburetted blue gas apparatus consists of a blue gas generator and an oil generator and means as well for mixing the two gases together to form the carburetted blue gas. This is actually the case. The first apparatus in the water gas plant is the blue gas generator, and as this has been fully explained in the lessons which dealt with blue gas, it is not necessary to describe it here.

The oil gas portion of the apparatus consists of one or more chambers or towers which are filled with a refractory checkerbrick and in this apparatus the oil gas is manufactured with the aid of the heat which is stored up in the checkerwork from the combustion of the carbon monoxide formed in the generator during the blow.

The standard carburetted blue gas set consists essentially of a generator, a carburetter and a superheater, which are provided with all the necessary connections for the introduction of the air, fuel, steam and oil, and also for the removal of the manufactured gas as well as the ash and blast products. There are also various auxiliary apparatus such as the oil pump, numerous controlling apparatus and instruments, wash box, seal, etc.

The Carburetter

The carburetter is simply a steel shell which is filled with checkerbrick. It is of the same height and size as the blue gas generator. It is similarly lined with a refractory brick and is also insulated with a layer of asbestos or similar material, generally from one to two inches in thickness. The checkerbrick in the carburetter is laid in the form of a grid, no binder of any kind being used. There is quite an art and science in the arrangement of the checkerbrick in the carburetter, for it is the function of the checkerbrick to gasify the oil, and inasmuch as oil is the most expensive raw material used in the gas making process, it is understandable that a great deal of care must be taken to see that the operation is carried out with the proper degree of efficiency so as to avoid any losses. This fact makes the manner of arranging the checkerbrick of considerable importance. However, the relation between the spacing and arrangement of the checkerbrick and the efficiency of conversion of oil into gas is a matter of intricate character and it is really not our province here to go into it in any more detail. It is sufficient to know that it is an important part of the operation of the carburetted blue gas set and the economy of the process depends largely on it.

It should be mentioned before leaving this subject that during the war, when there was great scarcity of gas oil supplies, other thick oils and certain low grade crude oils were tried out for the production of water gas. The result was, however, that the checkerbrick became rapidly clogged up with deposits of carbon and it was found impossible to operate the carburetter with this kind of fuel. Hence, the checkerless or empty carburetter was introduced, these thick oils being sprayed into the apparatus in the form of a very fine mist, the cracking being effected by the radiant heat from the lining of the carburetter, the heat in the blue gas itself, and finally that from the superheater which was filled with checkerbrick. It is stated that there are some advantages of the checkerless carburetter over that filled with the brick.

The Oil Spray

The really important part of the carburetted blue gas apparatus is the means that are provided for the handling of the oil, including not only the means for spraying or introducing the oil into the carburetter in such form that it is effectively and economically cracked, but also the other auxiliary apparatus for feed and measuring the oil introduced into the system. In the first forms of oil sprays the device was of such character that the oil was introduced in a solid stream into the carburetter. Then it was found to be of more advantage to spray or atomize the oil so that it entered in the form of a fine mist. This is the present tendency in oil sprays, the material being introduced into the cracking apparatus in the form of a nebulous vapor. Oil sprays are of many different types, and some are provided with water jackets so that they are cooled during the blasting stage when no oil is allowed to enter the carburetter.

PROVIDENCE GAS COMPANY'S NOTES ON CANNING

Of all the methods of present day food preservation, canning is the most familiar to the housewife. Fruit juices, jellies, jams, preserves, conserves, butters, pickles, and relishes are all included in the general term "canning."

Successful canning depends on two things: first, careful sterilizing of the food and the jars into which it is put; second, prevention of the entrance of any element which might cause the food to spoil.

There are certain utensils that are indispensable in canning, the most important is a large receptacle in which jars of food may be steamed or boiled, since "cold pack" is the most common method of canning.

The best jar is one of simple construction, one that can be sealed perfectly, that protects the canned food from contact with metals, and has the fewest parts to be lost or misplaced. The jar with a wide mouth and straight sides, with glass cover clamped on, gives general satisfaction.

To test a jar before using, run the finger around the edge of the opening to see whether or not the glass is smooth. Test the cover this way, too. If the lid rocks when clamped down, the jar is imperfect. Defective jars may be used for pickles, or other food which does not require sealing. Use new rubbers every year, as in time they lose their elasticity and cause imperfect sealing.

Blanching

Blanching is a preliminary step to canning and is used for all vegetables and most fruits. To blanch put the food in a large cheese cloth bag or wire container and immerse in boiling water for the required length of time, then dip in cold water. This procedure is necessary for a number of reasons; a closer pack is obtained, strong flavors and acids are destroyed, the color set, and the skins of certain fruits and vegetables are loosened and can be removed more readily.

Fruits are usually canned in a syrup, the thickness of which depends on the kind of fruit used and how rich you wish your product. Vegetables are ordinarily canned by simply adding salt and boiling water to them after they are packed in the jar. A little space should be left at the top, about one-half inch, to allow for expansion during the sterilizing. The rubbers and tops are then adjusted and the jars partially sealed. Jars should be placed on a rack in the bottom of the kettle; this prevents breakage and aids in the free circulation of water. The jars must be completely covered with water, and the sterilizing time counted from the moment the water begins to boil, after jars are immersed.

As soon as the jars are processed, remove from water bath and snap the clamps into place. Wipe dry and invert to cool. At the end of two or three days the jars should be carefully examined to make sure that the food has not begun to spoil. Store in a cool, dry place.

All fruits and vegetables that are to be canned should be very fresh, not too ripe, and free from any blemish.

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ARLINGTON GAS COMPANY STIMULATES CUSTOMERS' INTEREST WITH PRIZES FOR RECIPES

The Five Dollar Gold Piece Prize for the best recipe for Indian Pudding went to Mrs. M. K. Merrill, of 14 Rangeley Road, Winchester. The next best recipe (made with Shredded Wheat) was also sent in by Mrs. Merill.

The third best was one sent in by Mrs. John Sheehan, of 22 Grove Street Place, Arlington, whom Miss M. E. Talcott of the Modern Methods Kitchen, judge of the contests, declares has maintained a higher average of recipes than any other contestant in Arlington, Lexington, Winchester, Belmont or Waverley during the contests so far.

Prize-Winning Recipe—Indian Pudding

1 quart or 4 cups scalded milk
3 tablespoonsful Indian meal
1 cup molasses
Small teaspoonful cinnamon
Butter size of walnut
Salt

Pour into baking dish and just before placing in oven add a scant half cup of cold milk. Bake 3 hours in a moderate oven.

Serve with cream.

One of the most luscious small fruits that New England produces is the blackberry. During the month of August it grows wild on almost every

hillside and by almost every road, while in the gardens are found the larger and better flavored cultivated variety.

Blackberry jam and blackberry jelly are made and prized by the housewife, but the delicious blackberry pie is less often produced in our kitchens. There are doubtless many old-time recipes for this delicacy among our customers, and for the August prize contest we want good recipes. A Five Dollar Gold Piece for the recipe judged best.

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HOME SERVICE AND THE GOOD IT DOES THE COMPANY

Marjorie Pidgeon Wardman

Home Service Director, Brooklyn Borough Gas Co.,

(Abstract from paper read at Lake Mohonk)

THE old adage "Be it ever so humble there is no place like home" still rings true today. All over the country the great need for more homes and better ones is realized.

Nowadays practically every business concern offers some sort of free service to their patrons, and women especially will flock to these places where personal shopping, and interior decoration bureaus, etc., are in operation.

Do you not have a warm spot in your heart for a firm which goes out of its way to give you service and cater to your needs and comforts?

Home Service is just what its name implies, a free service offered to the homemakers where they may come for advice for the home. Its social side is necessary but Home Service also has a wider scope and a more vital meaning.

Home Service aims to assist in home-making by conducting cooking classes for women and children, distribution of recipes, radio talks, lectures, demonstrations, home visits and establishing the gas range as an up-to-date labor saving and attractive device, making cooking a pleasure instead of drudgery. Many women do very little cooking, especially baking, because of ignorance of the subject and they therefore abandon it. One homemaker of foreign birth, who apparently did little cooking and less baking, after listening intently to the instruction given said, "Oh, you bake upstairs and broil downstairs."

Activities Manifold

In addition to the cooking appliances all the other household activities which require gas are included by the Home Service Director in her lecture demonstrations. Hot water for laundry, household and personal use is stressed and the washing machine, with gas burner, gas ironer, dryer, the home incinerator and the gas fired refrigerator are all given their due regard.

We avoid any direct sales effort and the homemakers appreciate the fact "that we do not try to sell them anything."

To use gas intelligently invites the thrifty but frequent use of it.

Home Service has revived the making of jams, jellies, marmalades, and canning of fruits and vegetables and made it so attractive that women are again going in for this almost lost art.

Trivial complaints may be adjusted peacefully, making the consumer feel that we are really trying to be of service. These complaints may not seem so important to us, but they mean much to the homemaker who is trying to solve her problem.

A great many husbands are most insistent in urging their wives not to miss a single lesson, which proves that men also realize the value and benefit derived from the instruction and advice given by the Home Service Department. This tends to raise the standards of the home which in turn aids in raising the standards of the community.

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THIS IS A SPLENDID TIME TO START

J. B. Dillon

The hot weather is not afar, nor is canning season, and any one that knows anything about canning and the sterilizing of the glass jars knows that the canners have their hands full without having to worry with a vacillating fire (such as we get from the coal stove), nor do they care to have the ashes flying into the cooking fruits. Enlarge on these features and the comparative cost for the maintenance of the two kinds of cooking articles and the woman in the kitchen will be interested. On top of all of this call attention to the fact that the moment there is no further need for the gas range the flame can be instantly quenched, the range heat dying out within a short time, and even when going full blast the rise above the temperature of the room is a minimum above the normal temperature where a gas range is in action, and all of this is impossible with a coal stove, while to do this work by electricity means an excessive cost.

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HOME SERVICE DEPARTMENT TO HELP GAS USERS

Rendering better service and giving proper cooking instructions to the housewives throughout Southern California who are users of gas service on the lines of the Southern Counties Gas Company are part of a program that has been announced by the S. C. G. Company.

The Southern Counties Gas Company now has a staff of trained and experienced home service directors who are assisting the districts in organizing and promoting departments for the assistance of the customers. Territorial surveys will be made, and in addition many districts will arrange for special lecture-demonstrations before clubs, women's organizations, church groups and in the schools.

The staff of directors of home service now numbers four, including Miss Isobell Allobach of Santa Monica, Miss Margaret Hannah of Santa Ana, Miss

Corinne Kelly of Pomona and Miss Georgia McCardle of Monrovia, with additional directors planned for the other districts as soon as facilities make it possible. When the new Santa Barbara office is completed, that territory will have a home service department.

Miss Isobell Allobach has been with the company at Santa Monica for more than two years and her work in that district has proven very satisfactory. The three other home service representatives have been in the company's employ for varying periods of from 1 to 4 months.

In addition to our own department, the Tappan Stove Company of Mansfield, Ohio, has sent two nationally known directors to this coast to conduct cooking courses, lectures and demonstrations in each of the principal cities on our lines. These schools will be conducted through the courtesy of the local gas company.

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SULPHUR FROM GAS MAKING IS BOON TO FARMER AND GROWER

Results of recent tests made on a new sulphur compound recovered by the Pacific Gas and Electric Company of San Francisco, from ordinary manufactured gas, confirm earlier predictions that this product promises to give the agriculturist and fruit grower an insecticide and fertilizer superior to anything of the kind on the market today.

Present research work has developed to the point where the company has employed an experienced entomologist. This is the first time that such an expert has been added to the payroll of a public utility company.

Following intensive research work by the company itself, the agricultural laboratory of the University of California became interested. Careful tests made by the latter soon developed the fact that the activity of the sulphur compound as an insecticide exceeds that of any other form of sulphur sold for that purpose. Other tests substantiated its value as a fertilizer and its practical use as an insecticide in the form of sprays and dusting powders.

The company has been working along two separate research lines. It has tried to produce a commercial product that could be sold to companies manufacturing insecticides, and it has further carried on active field tests in the orchards of the Imperial Valley and elsewhere to prove the findings of the University of California.

That this sulphur will be a boon to agriculture is apparent when it is known that the size of the sulphur particles is smaller than any type of sublimed or ground sulphur.

This extreme fineness is a distinct advantage in agricultural uses, either in controlling pests or in fertilizing soil and neutralizing alkali, because the smaller the particle the more quickly will it volatilize and give quicker action. These minute particles also adhere to foliage better, the surface coverage is better and there is less tendency to wash off with light rains.

The sulphur now being made by the gas company is the only sulphur produced in California.

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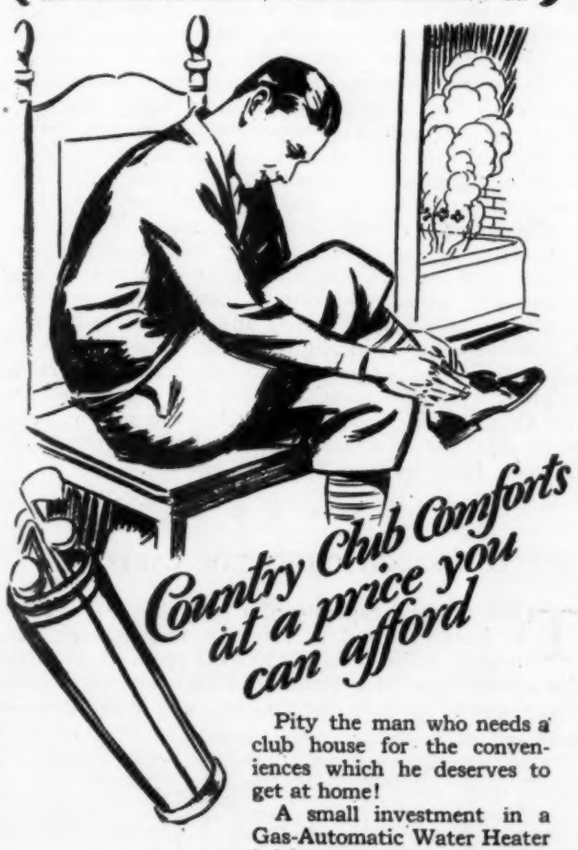
1823—MORE THAN 100 YEARS OF UNINTERRUPTED PUBLIC SERVICE—1927



Pity the man who needs a club house for the conveniences which he deserves to get at home!

A small investment in a Gas-Automatic Water Heater brings you at once a life membership in the Home Comfort Club.

Just Ask Your Gas Company!

Consolidated Gas Company
of New York
Geo. B. Cortelyou, President

130 East Fifteenth Street, N. Y. C., Room 1238:
Please send me your new water heating booklet, "Service Behind the Faucet," together with complete information on the subject of Gas-Automatic Hot Water Service.

NAME.....

ADDRESS .....

When Hot Water Is Most Needed

PROGRESS IN GAS TECHNOLOGY
Domestic and Foreign

PHENOL CONTENT OF GAS LIQUOR

AN INVESTIGATION was made to determine the phenol content of gas liquor and effluents from coke oven by-product plants and gas works. The various existing volumetric and gravimetric methods of determining phenol in these by-products were discussed. An improved method, in which all the sulphur compounds which are oxidized by bromide are completely removed, is to acidify the liquor (that is, a portion of one hundred cubic centimeters of it) and distill twice to a very small bulk, filter the phenolic distillate, and boil gently under a reflux condenser until all the hydrogen sulphide has been expelled, this lasting about fifteen minutes. About one cubic centimeter of a solution of barium chloride in water and two drops of phenolphthalein are added, and then dilute sodium hydroxide solution in slight excess. The solution is again boiled to aggregate the precipitated barium sulphate and carbonate, and filtered, the phenol in the filtrate being determined with the aid of bromine by the Koppeschaar method. Brennstoff Chemie, 1927, volume 8, pages 120-121.

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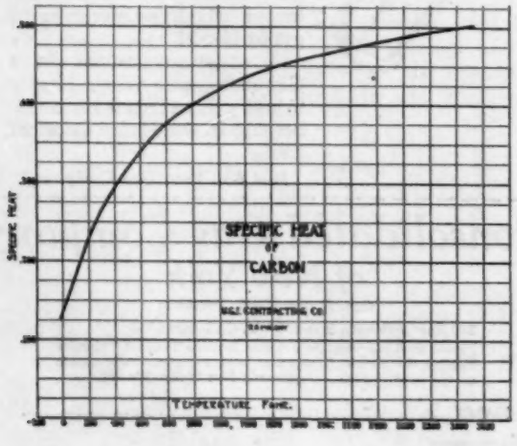
THE SPECIFIC HEAT OF CARBON

THE thermal capacity of a body is the quantity of heat required to raise its temperature one degree. The ratio of the heat required to raise the temperature of a given substance one degree to that required to raise the temperature of water one



degree from the temperature of maximum density—39.1 degrees F.—is commonly called the specific heat of the substance.

The specific heat of carbon is a very important figure in many of the thermo-chemical calculations of the gas engineer. The amount of heat imparted to or given up by a body of fuel in a generator can be arrived at only with a knowledge of the specific heat of the fuel at the temperature of the fuel in the generator. Heretofore the specific heat at higher temperatures has not been easily available, and the values given, usually obtained at room temperature, are much too small to be used in water gas calculations.

The accompanying curve, showing how the specific heat of carbon changes with temperature up to 3,200 degrees F., was prepared from data taken from a paper by A. G. Worthing in the Physical Review, 1918, p. 199, where the details of the method, which consisted of a precise measurement of the amount of electrical energy necessary to raise the temperature of a carbon filament, may be consulted.

We believe that the values given will be substantially correct for the carbon in the fuel bed of a water gas generator.—E. J. Brady, U. G. I. Circle, June, 1927.

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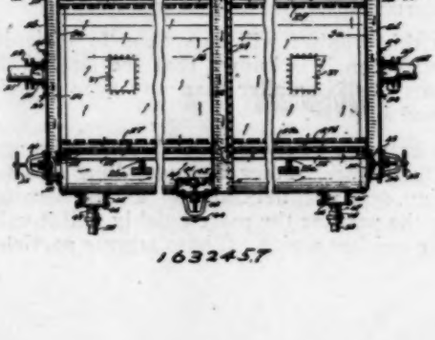
GAS PURIFYING APPARATUS

THE illustration shows a gas purifying apparatus which is patented in United States Patent No. 1,632,457. This purifying apparatus consists of a combination of cylindrical casing which contains a number of trays 27 which extend across a chord of the casing. These trays comprise a series of spaced slats which are adapted for supporting the gas purifying material which is placed on them. As can be seen from the figures, the openings 27a between the slats are staggered in one series with spaces between adjacent slats in the other series. This affords a greater path for the flow of the gases and insures greater time of contact between the gas and the purifying material.



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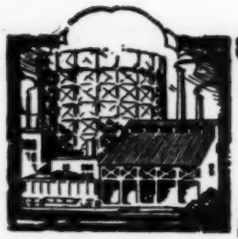
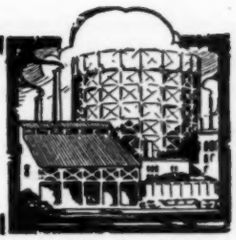


NEWS OF THE GAS INDUSTRY



U. G. I. Contracting Company Activities

Pawtucket, R. I.—The Pawtucket Gas Company has ordered the installation of a Smoot steam accumulator, which will concentrate the exhaust steam from the various steam draft units and utilize this steam in its carburetted water gas apparatus. Contract has been placed with the U. G. I. Contracting Company.

Far Rockaway, N. Y. — The Queens Borough Gas & Electric Company has added its name to the long list of waste heat boiler users and has lately contracted with the U. G. I. Contracting Co. for the installation of a boiler 6 feet 9 inches in diameter, and having a working pressure of 160 lbs. per square inch.

East Braintree, Mass.—The Old Colony Gas Company is remodeling the carburetted water gas apparatus at its plant and has contracted with the U. G. I. Contracting Co. to furnish the material and to do the work.

Tampa, Fla.—The U. G. I. Contracting Company has been engaged by the Tampa Gas Company to make engineering studies of that company's plant in connection with the rehabilitation of the plant to take care of present and future needs. Their commission from the Tampa Gas Company also includes the making of comprehensive plans of the works property, as well as detail plans of various portions of the plant.

Boone, Iowa.—The Iowa Railway & Light Corporation proposes to increase the condenser capacity at its Boone plant and has placed an order with the U. G. I. Contracting Company for one 5-foot 4-pass U. G. I. high duty condenser, together with the necessary connections.

"Coal Age" to Become a Monthly

"Coal Age," the well-known engineering weekly which serves the coal mining industry, is to become a monthly publication beginning with July 1, according to the announcement of the McGraw-Hill Publishing Company. This monthly engineering issue will be supplemented by a new periodical to be issued weekly by the same company under the name "Coal Age News." Mr. John M. Carmody, who has been associate editor of "Coal Age," assumes editorial direction of the two papers in their new form, with the title of editor-in-chief.

The publishers announce that the Coal Age News will be devoted exclusively to editorial matter and that it will appear in tabloid newspaper style. The purpose of this weekly will be to serve particularly the administrative and sales executives who require full weekly reports on market conditions, production figures and trade conditions generally. The monthly edition will, however, retain a news section summarizing the important events for the industry. Although under common publishing and editorial direction, subscription lists for the two periodicals will be separately maintained.

* * *

National Gas Furnace Co. Absorbs U. S. Gas Furnace Co.

The National Gas Furnace Company of Providence, R. I., has recently taken over the business and properties of the United States Gas Furnace Company, also of Providence.

SOUTHERN CALIFORNIA GAS APPLIES TO ACQUIRE SUBSIDIARIES

Application Filed to Purchase Three San Joaquin Valley Companies

Application for authority to purchase Central Counties Gas Company, River Bend Gas & Water Company and Hanford Gas & Power Company was filed with the California Railroad Commission by the Southern California Gas Company. The Southern California Company now serves seventy-four cities, towns and communities, and acquisition of the northern properties would add eleven additional municipalities to its distributing system.

Central Counties Gas Company, River Bend Gas & Water Company and Hanford Gas & Power Company operate in the towns of Visalia, Tulare, Exeter, Lindsay, Strathmore, Porterville, Dinuba, Reedley, Kingsburg, Parlier and Hanford, all of which are in the San Joaquin Valley. Operating headquarters are in Visalia.

* * *

Stacey Bros. Gas Construction Co. Completes Contracts

The Stacey Brothers report they have just completed a 200,000 cu. ft. gas holder for the Central Illinois Public Service Company at Canton, Ill. They also report that they very recently completed a 125,000 cu. ft. gas holder for the Indiana Gas Utilities Company at Richmond, Ind.

At Hannibal, Mo., the Stacey Brothers have completed for the Citizens Gas Company the outer section and second section of the guide frame of an old holder, thereby increasing the size of what was formerly a 50,000 cu. ft. single lift holder to a 100,000 cu. ft. two lift holder.

This type of holder construction is a difficult one.

Report of Nominating Committee of A. G. A.

New York.—The following report of the general nominating committee of the American Gas Association has been announced by Alexander Forward, managing director:

For President—Oscar H. Fogg, Consolidated Gas Co. of New York.

For Vice-President—Bernard J. Mullaney, the Peoples Gas Light & Coke Company, Chicago.

For Treasurer — Clifford E. Paige, the Brooklyn Union Gas Company, Brooklyn, N. Y.

For Directors (two-year term): H. C. Abell, Electric Bond and Share Co., New York; Chas. M. Cohn, Consolidated Gas, Electric Light & Power Co., Baltimore; J. S. DeHart, Jr., Isbell Porter Co., Newark, N. J.; F. C. Freeman, Providence Gas Co., Providence; R. W. Gallagher, East Ohio Gas Co., Cleveland; Arthur Hewitt, Consumers Gas Co. of Toronto, Toronto, Ont., Can.; T. N. McCarter, Public Service Electric & Gas Co., Newark, N. J.; Francis H. Payne, Metric Metal Works, Erie, Pa.; H. S. Schutt, C. H. Geist Co., Philadelphia, Pa.

The following have been nominated to serve as section officers for the year 1927-28:

Accounting Section: Chairman, Edward Porter, the United Gas Improvement Co., Philadelphia vice-chairman, F. H. Patterson, Rochester Gas & Electric Corp., Rochester, N. Y.

Industrial Gas Section: Chairman, F. C. Mackey, Public Service Co. of Northern Illinois, Chicago; vice-chairman, J. P. Leinroth, Public Service Electric & Gas Co., Newark, N. J.

Publicity and Advertising Section: Chairman E. Frank Gardiner, Midland Utilities Co., Chicago; vice-chairman, James M. Bennett, the United Gas Improvement Co., Philadelphia, Pa.

Manufacturers Section: Chairman, H. Leigh Whitelaw, American Gas Products Corp., New York, N. Y.; vice-chairman, John A. Fry, Detroit-Michigan Stove Co., Detroit.

Technical Section: Chairman, Walter C. Beckjord American Light and Traction Co., New York, N. Y.; vice-chairman, H. E. Bates, the Peoples Gas Light and Coke Co., Chicago, Ill.

Convention Calendar

September

12-16—Pacific Coast Gas Association. Annual convention, Hotel Casa del Ray, Santa Cruz, Cal. Clifford Johnstone, executive secretary, San Francisco, Cal.

Reduced Rates for Brazil, Ind.

Brazil, Ind.—Bearing out the terms of an order drafted about a year ago, when the Indiana Public Service Commission approved the purchase of the Brazil Gas Utility property by the Indiana Gas Utilities Company, the company has filed a schedule of reduced rates for Brazil, Ind., which become effective at once. The original order was written by Samuel R. Artman, then a member of the commission. The reduction is approximatelv 50 cents a month below the previous schedule.

* * *

Roberts Gas Burner Corporation Obtains Charter—To Manufacture Gas Appliances

Albany, N. Y.—The Roberts Gas Burner Corporation, Buffalo, has been chartered at Albany with $100,000 capital to manufacture gas burners, gas stoves, heaters, oil fixtures, etc. Millard J. Roberts, 95 Scott Street, Tonawanda; H. D. Powell, 600 Elmwood Avenue, and A. F. Riedl, 30 Letchworth Street, Buffalo, are directors and subscribers. Betsford, Mitchell & Albro, 925 Fidelity Building, Buffalo, are attorneys for the corporation.

Inspection Trips Planned for October Convention

New York.—A feature of the Ninth Annual Convention of the American Gas Association, to be held at the Hotel Stevens, Chicago, October 10 to 14, will be inspection trips to many of the manufacturing plants in which gas is used for heating.

These trips are being arranged by the Industrial Gas Section of the association to give the members a chance to inspect gas installations in actual operation. It is believed that the installations in Chicago are more diversified than in any other city, and the industrial men will have the opportunity of visiting plants in which gas is used for many purposes.

Those interested in making inspection tours of Chicago's industrial plants are urged to communicate with D. W. Chapman, manager industrial sales, the Peoples Gas Light and Coke Co. Every effort is to be made to arrange for inspection tours of the plants the members are most anxious to see. Mr. Chapman has prepared a form, with allowances for preferences, etc.

* * *

Industrial Gas Symposium Planned

"The Chemistry of Industrial Gas" is the title of a symposium planned by the gas and fuel division of the American Chemical Society for its meeting at Detroit during the first week of September. The officers of this division of the society are urging the authors of papers to interpret the subject broadly, in order that a wide variety of treatment may be assured. It is desired, however, that authors avoid the presentation of purely descriptive papers on plants or processes. It is also desired that economic conditions be given appropriate attention in addition to the scientific factors affecting industrial gas.

Reorganize Board of the Worcester Gas Light Company

Eight New Directors Elected—De Witt Clinton Made One of Two Vice-Presidents and Re tains Place as Treasurer

Worcester, Mass.—The board of directors of the Worcester Gas Light Co. was increased from eight to fifteen at a recent meeting, giving the New England Gas & Electric Association a representation of eight. The Worcester members remain, excepting Dr. Homer Gage, who resigned.

Two vice-presidents were elected. DeWitt Clinton, treasurer of the company, will continue in that capacity, and Warren Partridge, of New York, representative of the new owners. Paul L. Morgan will remain as president for the present.

The new directors, all of New York, are: J. I. Mange, H. C. Hobson, Warren Partridge, Daniel Starch, J. M. Daly, E. T. Edmonds, C. A. Dougherty and H. C. Fleck, the last named filling the vacancy caused by the resignation of Dr. Gage.

The Worcester members with the exception of Dr. Gage remain. They are DeWitt Clinton, George Crompton, Francis H. Dewey, Paul B. Morgan, Charles G. Washburn, Dr. Samuel B. Woodward and Burton H. Wright.

Vice-President Partridge will not be located in Worcester, but will continue his offices in Boston and New York.

Under the Gas & Electric Association ownership, the local management of the Gas Company remains practically unchanged, so far as the public's contact with the company is concerned.

Mr. Clinton's promotion comes after fourteen years of service as treasurer. He was elected to the office in January, 1923, when he resigned the post of city treasurer, which he had held for six years. In his long service as an important factor in the management, the gas company has passed through a critical period of its history, including the World War and the strike of 1919, and also the transition of the gas industry as a whole into an era where heat and not light is its dominant interest.

The meeting of the common stockholders authorized the calling of the company's outstanding $350,000 of 8 per cent preferred shares, as of July 1, at $105 a share, the call price. This action was taken to make legal the exchange of shares turned in by the old stockholders for 5½ per cent preferred shares of the Gas and Electric Association, in accordance with the offer of fifteen shares of Gas and Electric Association of $100 par value for seventeen shares of Gas common of $25 par value.

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George Hobbs Joins Ruud Twenty-Year Club

Another veteran joins the Ruud Twenty-Year Club—Geo. Hobbs, manager of the Ruud factory at Toronto, Ont.

From its inception the Ruud Canadian factory has been under the guiding hand of George Hobbs. In May, 1907, he was appointed Canadian manager of the Ruud Canadian branch at Toronto, Ont., and has continued in that capacity ever since.

* * *

Immense Gas Line to Be Constructed

Texas is to get the largest natural gas line ever laid in that state if present plans go through, and it is understood that it is assured. The Houston Gulf Gas Company, the Moody Corporation, Dixie Gas & Utilities Company, will build the pipe line from Northwest Louisiana for 140 miles to a point near Livingston, Texas. It will be 22 inches in diameter. From this point it will fork, one going to Houston, the other to Port Arthur. The cost will be about ten million dollars.

Commission Grants Petition for Extension of Mains in Village of Oakfield

Albany. — The Public Service Commission has granted the petition of the Republic Light, Heat & Power Co., Inc., of Buffalo, for permission to extend its gas lines in the town and village of Oakfield, Genesee County, and approved of the exercise of franchises therefor granted by the town and village boards. Rates to be charged for gas have been approved by the board of trustees of the village and by the town board.

* * *

British Production of Coke and By-Products

According to the third census of production of 1924, there was a striking increase in coke oven by-products, due not so much to the greater quantity of coal carbonized as to greater efficiency in the process. In 1907 the value of by-products was 7 per cent of the gross output; in 1912 it was 18 per cent and in 1924 31 per cent. The following production figures of coke oven by-products are from the third census of 1924: Coke 12,803,000 tons; tar, 500,000 tons; sulphate ammonia, 185,000 tons; anthracene, 66,000 hundredweight; benzol, 37,900,000 gallons; carbolic acid, 28,000 hundredweight, naphtha, 1,812,000 gallons; naphthalene, 191,000 hundredweight; pitch, 151,000 tons; tar oil, creosote oil and other heavy oils, 17,132,000 gallons; tar oils, 1,669,000 hundredweight; toluol, 320,000 gallons. The total value of the by-products, including waste heat sold, other distillation products, etc., was £24,389,000. — (Trade Commissioner H. S. Fox, London.)

* * *

Upham Company Buys Clarendon Franchise

Clarendon, Texas.—The Upham Gas Company has bought the right to furnish Clarendon with natural gas from A. H. Hardendorf, of McLean. Hardendorf had been given a franchise by the city commission some few weeks ago. The Upham people state that they will be ready to serve gas by September 10.

Employment of Nation Now At 81% of Highest Possible Peak

New York. — Forecasting the business and employment outlook for the coming summer, a survey just completed by the National Association of Manufacturers shows that the industries of the nation are now operating, and will continue to operate for the next three months, on the remarkably high basis of more than 81 per cent of their maximum employment capacity.

Nineteen per cent of these plants are now running at their full employment capacity, and 29 per cent are operating with 90 per cent of their maximum forces. Translating this into terms of normal good business, it is estimated that 90 per cent of the plants are today on a substantial employment basis and operating on a high production scale.

Employment Decline Under 3%

The association sent questionnaires to 3,000 members of its organization in pivotal sections, from the Atlantic to the Pacific, for an instantaneous reflex of the employment situation. The questionnaire went to companies with payrolls ranging from as small as a dozen hands to companies with 40,000 employes. Replies were received from 2,203 companies, and these reported that the number of employes required in their plants to maintain maximum capacity was 1,509,920, an average of 685 per company; and that they now have under employment 1,227,325, or an average of 557 per company. This survey encompasses all industry and even includes many seasonal industries that are now at their lowest production scale. As compared with employment at the same time last year, this shows an actual falling off of less than 3 per cent, in spite of reports spread by the perennial pessimists.

The survey covered twenty-three classifications of industry—agricultural machinery, automobiles, automobile accessories, builders and plumbers' supplies, chemicals, clothing, electrical and radio, food, furniture, glass, hardware and tools, instruments, jewelry, leather, lumber, machinery, music, printing, pottery and clay, rubber, steel and iron, textiles and miscellaneous.

Plants Running Three Shifts

More than a score of plants in various lines report running three shifts. In the textile lines, reputed to be in difficulties in sections, 19 per cent of those reporting are running full forces and 29 per cent are operating at 90 per cent of full capacity. Glass manufacturers, makers of pottery and clay products, chemical plants, manufacturers of printing supplies and printing appear in excellent shape, 50 per cent of those reporting in each of these lines running at 90 per cent of their complete employment capacity. Makers of various instruments come next; 42 per cent report operating with 90 per cent of their full forces. In only one industry, agricultural machinery, is a decided drop shown, those reporting operating with less than two-thirds of their complement.

The proportions in other industries that are operating with 90 per cent of their full forces are: 35 per cent of the manufacturers of builders and plumbers' supplies and the lumber men; 33 per cent of the manufacturing jewelers; 32 per cent of the clothing makers, and in steel and iron; 26 per cent in machinery; 25 per cent in furniture and automobile accessories; 24 per cent in electrical; 22 per cent in automobiles; 21 per cent in food and leather; 19 per cent in hardware and tools; 16 per cent in rubber and music. In the miscellaneous group (always a good barometer of business), some of which employ as high as 30,000 men, 19 per cent report operating full time and 27 per cent with 90 per cent of full payrolls.

Georgia Power Co. Opens Fine Display Room for Industrial Gas Appliances

Atlanta, Ga.—What is believed to be the finest display room for industrial gas appliances ever to be opened in the South has just been completed by the Georgia Power Company in its newly renovated Walton Street unit. Together with the new kitchen, cafeteria, display room and offices, it represents an investment of approximately $250,000. And th value of the appliances being shown runs to more than $50,000.

The gas appliance display room is located in the basement of the new unit, along with the demonstration kitchen and cafeteria of the company. The walls and ceiling of the room are in white tile, with borders of blue. The floor is laid in marbled linoleum, making it both soundless and lasting While the lighting is indirect, giving the room brilliancy despite its basement location.

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Wide Range of Industrial Appliances.

The widest range of industrial gas appliances is on exposition. An incomplete list includes a gas melting pot of commercial size, a gas furnace, three types of gas-fired boilers, two gas heated forges, a gas rivet heater, three gas-heated metal furnaces, two gas plates, six gas ranges of different type, a waffle stand for restaurants, and a burner display table showing 20 different types of gas burners.

All of the appliances are connected up with the "source of supply" and can be demonstrated at any time. A skilled mechanic is always on hand to demonstrate any of the appliances being shown.

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City Man to Texas Place

John Baxter, assistant superintendent and gas engineer of the gas department of Oklahoma Gas and Electric Company, will leave Oklahoma City Saturday for Houston, Texas, where he will be associated with the Southwest Gas Company as operating manager.